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AUTHOR Watkins, James F.: And Others

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ABSTRACT

These performance tests for the area of transportation/automotive mechanics consist of a sampling technique (domain referenced tests) which covers all the possible performance situations. When used in total, they may also serve as a comprehensive test. Introductory materials discuss domain referenced testing, determining the domains, and developing performance testing situations. For each domain an item form sheet is provided which is a list of rules for developing a domain referenced test (DRT). It includes a domain statement describing the behavior and content of the domain: instructions, giving directions on how to determine an appropriate testing situation: customer cues, giving customer complaints and a stratified listing of elements keyed to each complaint: content limits, including facets and elements of a potential test and identifying the allowable content of a DRT: and evaluation--a score card consisting of performance indicators with standard and minimum scores assigned. These domains are covered: (1) heating and cooling systems, (2) fuel system, (3) body electrical system, (4) braking system, (5) engine system, (6) power train system, (7) starting and charging systems, (8) ignition system, (9) suspension and steering systems, (10) emissions control system. (DRTs for theory and task-detailing booklet are available separately as CE 027 747 and CE 027 745.) (YLB)

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STUDENT ASSESSMENT SYSTEM

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Developed By

The University Of Georgia

under the direction of

Dr. Paul Scott

Vocational Education Materials Center

Division Of Vocational Education

College Of Education

The University Of Georgia

Dr. George L. O'Kelley, Jr.,

Division Chairman

TRANSPORTATION/AUTOMOTIVE MECHANICS

DOMAIN REFERENCED TESTS

VOLUME I: SKILLS

DEVELOPED BY

James F. Watkins

CONSULTANTS

Bill Carter
Ann Chapman
J. W. Fryer
P. H. Garrison
Willie Johnson
Wallace Privette

December, 1980

Division of Vocational Education
College of Education
University of Georgia, Athens, Ga.

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Dr. G. L. O'Kelley, Jr.; Chairman
Division of Vocational Education
628 Aderhold Hall
University of Georgia
Athens, Georgia 30602

TABLE OF CONTENTS

Introduction..... 1

Determining the Domains..... 3

Test Administrations..... 5

Definition of Terms..... 6

Domains

I: Heating and Cooling Systems.....11

II: Fuel System.....17

III: Body Electrical System.....23

IV: Braking System.....29

V: Engine System.....35

VI: Power Train System.....41

VII: Starting and Charging Systems.....47

VIII: Ignition System.....53

IX: Suspension and Steering Systems.....59

X: Emissions Control System.....65

Appendices

A - Sample Test Situation.....73

B - Skills Test Administrators Information Form.....77

C - Skills Test Student Information Form.....81

DOMAIN REFERENCED TESTING

Introduction

Domained Referenced Testing (DRT) is a procedure designed to determine, with a great degree of accuracy, where to place a student within a training cycle. It provides a method for the stratified random sampling of items from a universe (domain) of test items. The procedure can be used to develop either cognitive or psychomotor test items. A competent (saturation) level of learning in a specified domain is required in order for a student to exclude specific training from a course of study. Areas of competence can be clearly shown through the use of a DRT instrument. There are two general requirements for the construction of a DRT. First, all items that could possibly appear in the test should be specified in advance. Secondly, the items in a particular test should be selected by random sampling or stratified random sampling from the universe of content.

This description of a DRT differs from both Norm Referenced Testing (NRT) and Criterion Referenced Testing (CRT). The difference between NRT and DRT is the method of selecting items to be included in the test and interpreting scores. Where NRT uses its data for prediction and selection, DRT collects data for determining competency improvement and transfer of learning.

The distinctions between DRT and CRT are not as pronounced. A CRT measures specific competencies, identifies those who have not mastered an objective, identifies the areas of non-mastery and assists in instructional design. CRT appears to assume that a transfer of learning exists. The primary difference is that in a DRT an extensive pool of test items exist which represent the basic characteristics of important parts of the universe of knowledge. DRT uses these items randomly to measure transfer of learning

by observing the methods and results that a student conveys while being tested. Transfer of learning is an important part of vocational education. Instructor product bias, availability, and high costs have in many instances led to the student being taught psychomotor and cognitive skills using one brand, make or model of training aids and devices.

It is not the intent of the writers to replace CRT's with DRT's. Criterion referenced testing should be used throughout the training program to evaluate the performance objectives; whereas, domain referenced testing is used to measure the extent of transferable skills, whether or not skills learned are useful, and to achieve curriculum articulation from one institution to another. A domain evaluation requires the teacher to focus on transferable, generalized skills and knowledge rather than rote learning. It does this by measuring a stratified random sample from a universe of knowledge rather than the criteria of a specific objective.

It has been noted that norm referenced testing and criterion referenced testing cannot link mastery learning with transfer of knowledge. To locate this void, a clear theory of measurement and the research and development of domain referenced testing in Vocational Education is proposed. The main idea behind DRT is to assess a student's knowledge and to place that student at a point in a program which is equivalent to the student's mastery level. This would have a three-fold positive effect. (1) The student would be processed through the course and enter the labor market in a minimal amount of time, (2) DRT's would provide an optimum basis for developing an individualized education plan (IEP), for the post secondary handicapped, and (3) would allow a greater number of students, per year, to participate in post secondary education.

Determining The Domains

The Automotive mechanic domains were developed through an analysis of each task within the occupation to determine the elements (variable components) of the task. It was determined from this analysis that the most practical method for identifying task domains was through a division into automotive systems. The following systems domains were identified and tasks were assigned to each domain based on their relation to the actual performance or knowledge required.

I Heating and Cooling Systems
II Fuel Systems
III Body Electrical System
IV Braking System
V Engine Systems
VI Power Train System
VII Starting and Charging Systems
VIII Ignition System
IX Suspension and Steering Systems
X Emissions Control System

After the final list of domains (systems) was determined and tasks were assigned to them, the domains and tasks were analyzed to determine the facets (Component Parts) included in each domain. The criteria for this analysis was to identify those facets which would make a significant difference in how each task would, or could, be performed. Some of the facets of a domain may be related to several tasks while others were specific to a task or sub task. The following are examples of some of the facets found in the Heating and Cooling Systems Domain.

A. Water Pump
B. Belt
C. Hoses
D. Coolant
E. Radiator
F. Cap
G. Heater
H. Heater Control
I. Fan
J. Thermostat
K. Malfunctioning Warning System
L. Over-flow Tank

Under each facet elements were listed. An element is a malfunction that can occur to a facet (part). An example of elements listed under Facet A, Water Pump, of the Heating and Cooling Systems Domain would be:

(A) Water Pump

1. leak
2. defective bearing

The performance portion of a Domain Referenced Test consists of an Item Form Sheet, a Content Limits Sheet and an Evaluation Device.

The Item Form Sheet is a list of rules for determining a performance testing situation to measure skills from a domain. The Item Form Sheet includes the following sections.

(1) Domain Statement - it generally describes the behavior and content of the domain.
(2) Instructions - these give directions on how to determine an appropriate testing situation.
(3) Customer Cues - customer complaints and a stratified listing of elements keyed to each complaint.

The Content Limits Sheet contains all of the allowable content for a performance test in the domain for which it was designed. In an automotive mechanics DRT the content limits sheet is simply a listing of facets (parts) and elements (malfunctions). Any revision of, or addition to, the content limits should be made before a testing situation is chosen. A key to the reliability of a domain referenced test is the inclusion of all possible testing content in the domain and the random selection of content to be included in the test. If content is added while choosing a testing situation the random selection process will be negated, which could give cause to raise questions about the reliability of the test.

Adding facets or elements to the content limits is a relative simple procedure. When a facet appears to need new elements added, they should be placed where necessary. If an entire facet appears to be missing, add it and the corresponding elements as necessary.

The Evaluation Device is a scorecard used to evaluate the process and product of the students work. It consists of Performance indicators with standard and minimum scores assigned. The student must achieve at least the minimum score on each performance indicator. The column for self evaluation should be filled in by the student during or immediately following the test. The instructor should compare scores and explain any large deviations. There is a place provided at the bottom of the scorecard for appropriate signatures.

Using the evaluation results, and other criteria if necessary, a decision is made on whether to give the student advanced standing.

Test Administration

The performance testing environment must be arranged to permit the best evaluation of the student's skills in each domain. Every attempt should be made to provide as realistic a situation as possible.

Included in the appendices are three forms that will assist the instructor in setting up the test; the Skills Test Administrator's Information form, the Student Skills Test Information form and a Sample Test Situation form.

After test item selection has been made, complete the Test Administrator's form and the top portion of the Student's Test Information form. The sample test can be used as a guide in setting up all domain referenced tests.

DEFINITION OF TERMS

This project includes, by necessity, certain terms peculiar to the subject under consideration. These terms are identified as follows.

Content Limits - The boundaries of a domain that identifies the allowable content of a Domain Referenced Test (DRT). Usually grouped into facets and elements of the facets. Identifies the allowable content of a DRT.

Competency - The ability (knowledge, skills and attitudes) to perform all of a group or cluster of related tasks required to complete a designated activity according to occupational standards. In the educational setting the statement of a competency includes expected student outcomes in terms of knowledge, skills, and attitudes required to complete a designated activity as defined by incumbent workers according to the standards of the work place.

Comprehensive Examination - An examination which includes test items for each element of knowledge and/or skill in a specified area to be tested.

Domain - A well-defined set or cluster of related tasks. Specific relationships are determined through an analysis of the tasks.

Domain Referenced Test (DRT) - A test developed from a stratified random selection of test elements.

Domain Statement (Description) - A general descriptive statement that identifies the behavior and the content upon which the test may focus.

Duty - A group of related tasks which constitute a standardized part of a whole job (worker responsibility, unique use of equipment or machinery and specific system designs).

Elements - Variable components (alternatives) of the facets used to form test items. One or more elements from separate facets may be combined to form a test item.

Facets - Characteristics on which domain test items may differ. Facets are made up of groups of related but variable components which are called elements.

Item Form Sheet - A list of rules for generating a set of related test items. (Hively, 1974). An Item Form Sheet includes the instruction or rules for forming a test item and the limits of the content of the test item.

Job - A specific area of specialization within an occupational field consisting of several closely related duties for which a person would expect to receive remuneration. Should be identified by DOT code.

Structured Interview - An oral examination of a student's ability administered by the instructor and developed from content that has been previously identified and delimited by domain.

Task - The smallest division of work in which a measurable output occurs. A logical and necessary step in the performance of a duty.

Test Item - A statement of a situation or a question designed to evoke a specific response or set of responses. The responses may be verbal, written, psychomotor or a combination of response types.

Test Item Pool - A list or group of test items related to a specified area of knowledge and/or skill to be tested.

Waiver - The act of allowing students to bypass instructional units in which they have demonstrated previously acquired knowledge and/or skill.

I. Heating and Cooling Systems Domain Tasks

Description: Diagnose present and potential problems in the heating and cooling systems of liquid cooled engines. Test, remove, repair and replace the faulty components.

*Check coolant freezing point.
*Check coolant temperature.
*Check overflow tank.
Chemically clean and flush cooling system.
*Inspect, adjust, or replace fan belts.
Perform chemical test on cooling systems.
*Pressure test cooling system.
*Remove and replace radiators.
Replace core plugs (freeze plugs).
*Replace heater hoses.
*Replace radiator hoses.
*Replace variable speed fan.
*Replace water pump.
Solder minor leaks in radiators.
*Test and replace thermostat.
*Diagnose heating system malfunctions.
Replace defroster hose.
Replace heater control units.
Remove and replace heater core.
Repair heater core.
Service heater control components.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN I: HEATING AND COOLING SYSTEMS

Item Form Sheet

Domain Statement: Diagnose present and potential problems in the heating and cooling systems of liquid cooled engines. Test, remove, and replace the faulty components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you that the overheat warning light comes on during a hard pull.

Customer 2 - Tells you that she must constantly refill her radiator.

Customer 3 - Tells you that his heater blows cold air.

For Customer 1 choose one element from Facets E, J, L, D

For Customer 2 choose one element from Facets A, C, E, F, G

For Customer 3 choose one element from Facets D1,E, G, H, J

CONTENT LIMITS SHEET

(A) Pump

1. leak
2. defective bearing

(B) Belt

1. deteriorated
2. broken
3. loose

(C) Hoses

1. loose connection
2. deteriorated
3. punctured or leaking

(D) Coolant

1. low content
2. high freezing point

(E) Radiator

1. plugged
2. punctured or leaking

(F) Cap

1. bad seal
2. weak spring
3. improper pressure

(G) Heater

1. plugged
2. leaking

(H) Heater Control

1. vacuum motor stuck
2. cable broken
3. vacuum lines loose

(I) Fan

1. out of balance
2. faulty clutch
3. loose

(J) Thermostat

1. open
2. closed
3. wrong heat range
4. installed wrong

(K) System Failure Warning

1. sending unit bad
2. dash unit bad

(L) Over-Flow Tank

1. leaking
2. loose

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN II

II. Fuel Systems Domain Tasks

Description: Diagnose present and potential fuel system malfunctions and test, remove, repair and replace faulty components.

*Adjust carburetor.
*Analyze for moisture or foreign particle level in fuel system.
*Clean carburetor.
*Clean or replace fuel filter.
*Inspect, service, or replace carburetor air cleaner.
*Replace gas tank sending unit.
*Install carburetor.
*Measure fuel flow and pressure.
*Remove and replace fuel pump.
*Repair or replace fuel lines and hoses.
*Repair or service carburetors.
*Service or repair manifold heat controls.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN II: FUEL SYSTEMS

Item Form Sheet

Domain Statement: Diagnose present and potential fuel system malfunctions and test, remove, repair and replace faulty components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you they smell gas strongly after stopping their car.

Customer 2 - Tells you that when they reach 55 mph, their car quits running then starts back up at a slower speed.

Customer 3 - Tells you they get very poor gas mileage.

Customer 4 - Tells you their car is very difficult to restart while it is still hot.

For Customer 1 choose one element from Facets A, B, C, E

For Customer 2 choose one element from Facets B, C, E

For Customer 3 choose one element from Facets A, B, D

For Customer 4 choose one element from Facets A, D

CONTENT LIMITS SHEET

(A) Carburetor

1. flooding
2. external leaks
3. internal restriction
4. improper choking

(B) Fuel Pump

1. leaking gas
2. leaking oil
3. low pressure output

(C) Fuel Filter

1. clogged

(D) Air Filter

1. clogged

(E) Fuel Lines

1. leaking
2. restricted
3. kinked

(F) Fuel Level Sending Unit

1. inaccurate
2. inoperative

(G) Fuel Tank

1. leaking
2. contaminate

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN III

III. Body Electrical Domain Tasks

Description: Diagnose and repair body electrical malfunctions including testing and rewiring or replacing components.

Replace ignition switch and resistor.
Perform operational inspection of lighting systems.
Replace flasher units.
Repair or replace fuse box assembly.
Repair or replace lighting system components.
Repair or replace switches.
Repair windshield wiper mechanisms and controls.
Locate and repair shorts and open circuits in wiring.
Replace chassis and underhood wiring.
Analyze cause of electrical fires.
Test and repair cruise control units.
Test and rewire dash units.
Adjust headlights.
Adjust backup light switches.
*Service or replace batteries, cables, and battery box.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN III: BODY ELECTRICAL

Item Form Sheet

Domain Statement: Diagnose and repair body electrical malfunctions including testing and rewiring or replacing components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements from the test situation.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you that their turn signal does not blink.

Customer 2 - Tells you that she got a ticket for not having brake lights.

Customer 3 - Tells you his windshield wipers make a whining noise.

Customer 4 - Tells you that his car failed inspection but isn't sure exactly what the problem was.

Customer 5 - Tells you that she has a hard time seeing her instrument panel at night.

For Customer 1 choose one element from Facets B, C, G, H

For Customer 2 choose one element from Facets B, G, H

For Customer 3 choose one element from Facets B, D, G

For Customer 4 choose one element from Facets B, G, H, I

For Customer 5 choose one element from Facets B, E, G

CONTENT LIMITS SHEET

(A) Ignition Switch

1. buzzer inoperative (ignition key)
2. open contact

(B) Lighting

1. burned out filament/s
2. defective switch
3. loose ground
4. shorted wiring
5. open wiring

(C) Battery

1. no charge (dead)
2. weak charge
3. broken cable clamp
4. corroded cable/s

(D) Windshield Wipers

1. defective motor
2. stripped gears
3. only one speed

(E) Instrument Panel

1. no dash lights
2. printed circuit board cracked

(F) Cruise Control

1. defective control head
2. erratic operation

(G) Fuse Block/Box Wiring

1. blown fuse
2. loose connections

(H) Turn Signals

1. lever remains in selected (turn) position
2. defective
3. no electrical feed for tail-lights
4. lights on but not blinking

(I) Horn

1. won't blow
2. blows constantly

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN IV

IV. Braking System Domain Tasks

Description: Diagnose present and potential brake failute. Inspect, test, remove, overhaul and replace brake system components.

*Arc grind brake shoes.
*Adjust brakes.
*Adjust parking brake linkage.
*Adjust hand brake external band.
*Bleed hydraulic brakes.
*Free-up parkinb brake cables.
*Inspect and replace brake pads (disc brakes).
*Inspect and turn rotor (disc brakes).
*Inspect and refinish brake drums.
*Inspect and replace self-adjusters.
*Perform operational brake inspection.
Recondition backing plates.
Reline brake shoes.
*Repair disc brake calipers.
*Repair master cylinder.
Rebuild brake power units.
*Repair self-adjusters.
*Repair wheel cylinder.
*Replace brake hoses and lines; replace hydraulic lines and fittings.
*Replace brake shoes.
*Replace hydraulic control valves.
Replace hydraulic brake power units.
Replace hydraulic power cylinders.
*Replace master cylinder.
*Replace wheel cylinder.
Replace parking brake linkage.
Replace hand brake external band.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN IV: Braking System

Item Form Sheet

Domain Statement: Diagnose present and potential brake failure. Inspect, test, remove, overhaul and replace brake system components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements from the test situation.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Use the determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you that her brake pedal pulsates when applying the brakes.

Customer 2 - Tells you her car pulls hard to the left when applying the brakes.

Customer 3 - Tells you his brakes make a squeaking noise.

Customer 4 - Tells you his pedal goes to the floor.

Customer 5 - Tells you that their power brakes are not what they used to be.

For Customer 1 choose one element from Facets C, D

For Customer 2 choose one element from Facets B, C, D, F

For Customer 3 choose one element from Facets C, D

For customer 4 choose one element from Facets A, B, D, E, F

For customer 5 choose one element from Facets A, D, E

CONTENT LIMITS SHEET

(A) Master Cylinder

1. internal leak
2. external leak

(B) Wheel Cylinders or Calipers

1. external leak
2. stuck piston

(C) Drums or Rotors

1. scored
2. out of round

(D) Shoes or Pads

1. oil or fluid on lining
2. excessively worn
3. crystalized

(E) Power Booster

1. defective valve
2. leaking diaphram
3. defective vacuum hose

(F) Brake hose and lines

1. leaking
2. cracked
3. restriction

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN V

V. Engine Systems Domain Tasks

Description: Diagnose present and potential engine malfunctions and test, remove, repair and replace faulty components.

*Adjust valves.
Steam clean engine.
Clean engine parts and check for condition.
*Diagnose valve train and head malfunctions.
Disassemble engine.
Fit piston pins.
*Grind valves.
Replace crankshaft and main bearings.
Inspect and correct bearing fit.
Inspect crankshaft and connecting rod assembly.
Inspect exhaust system.
*Inspect head for warp.
*Replace exhaust manifold(s).
*Perform cylinder compression test.
Perform cylinder balance test.
Perform cylinder leakage test.
Perform operational inspections of the engine lubrication systems.
Remove engine from vehicle.
Replace connecting rods and bearings.
Replace engine mounts.
Replace flywheel and flywheel ring gear.
Replace camshaft.
Replace camshaft bearings.
Replace timing gears and chains.
Replace gaskets and seals.
Replace valve lifters.
Remove and replace oil pump.
Remove and replace oil pan.
Replace pistons.
Replace piston rings.
Replace gaskets and seals.
*Replace valves.
*Replace valve guides.
*Replace valve seals.
*Re-surface valve seats.
*Service rocker arm assembly.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN V: Engine Systems

Item Form Sheet

Domain Statement: Diagnose present and potential engine malfunctions and test, remove, replace, or overhaul faulty components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements from the test situation.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you her engine makes a funny noise.

Customer 2 - Tells you he has to put 3 quarts of oil in every 100 miles.

Customer 3 - Tells you his car seems to miss.

Customer 4 - Tells you her car shakes terribly when idling.

Customer 5 - Tells you her car back fires through the carburetor and won't start.

For customer 1 choose 1 element from Facets A, B, C, D, E, F, G, H

For customer 2 choose 1 element from Facets A, B, C

For customer 3 choose 1 element from Facets B, D, E

For customer 4 choose 1 element from Facets B, E, F, G

For customer 5 choose 1 element from Facets B, D, E, G

CONTENT LIMITS SHEET

(A) Engine Block

1. Excessive cylinder wear
2. cracks

(B) Cylinder Head and Valves

1. warped surface
2. excessive valve guide wear
3. cracked
4. valve stem bent
5. weak or broken spring
6. burned valve

(C) Piston and Connecting Rod

1. excessive wear
2. cracked
3. bent

(D) Crankshaft and Camshaft

1. excessive wear
2. drive gear excessively worn
3. bent

(E) Valve lifters, push rods and rocker arms

1. excessive wear
2. collapsed
3. varnish build up
4. push rod bent

(F) Flywheel and Harmonic Balancer

1. ring gear worn
2. mounting holes worn
3. out of balance
4. scored surface (flywheel)

(G) Engine Mounts

1. broken
2. deteriorated

(H) Timing chain and/or gears

1. excessively worn
2. broken or stripped

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN VI

VI. Power Train Domain Tasks

Description: Diagnose present and potential power train malfunctions and test, remove, repair and replace faulty components.

Adjust external shift linkage on manual transmission.
Adjust clutch.
Analyze and repair electrical control circuit and components for overdrive unit.
Diagnose differential malfunctions.
Inspect drive shaft, U-joints, and center bearings.
Lubricate or replace speedometer cable and housing.
Lubricate universal joints.
Rebuild overdrive unit.
Rebuild manual transmission.
Repair hydraulic-type clutch.
Repair or replace differential.
Replace spider gears (pinion).
Replace universal joints.
Repair, replace, or adjust front drive axle assemblies.
Replace mechanical-type clutch.
Replace manual transmission.
Replace manual transmission rear seal, gasket and bushing.
Replace pinion seal.
Replace pilot bearing.
Replace rear axle shaft, bearing and seal.
Replace speedometer drive gear.
Replace clutch release bearings (throw-out bearings)
Replace transmission mounts.
Test manual transmission operation.

DOMAIN VI: POWER TRAIN SYSTEMS

Item Form Sheet

Domain Statement: Diagnose present and potential power train malfunctions and test, remove, repair and replace faulty components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you her car makes a chattering noise when she releases the clutch pedal.

Customer 2 - Tells you that his engine races and he smells a funny odor when going up an incline.

Customer 3 - Tells you that she has a difficult time shifting gears.

Customer 4 - Tells you that her car makes a funny noise.

Customer 5 - Tells you that he hears a clicking and squeaking noise when starting off.

Customer 6 - Complains of a grease puddle left by his car after parking it overnight.

(Customer Cues Continued to next page)

For Customer 1 choose one element from Facets A, B, C, G

For Customer 2 choose one element from Facets A, L

For Customer 3 choose one element from Facets D, L, B

For Customer 4 choose one element from Facets H, G, I, E

For Customer 5 choose one element from Facets G, B

For Customer 6 choose one element from Facets H_3 and/or E_5

CONTENT LIMITS SHEET

(A) Clutch Disc

1. worn or damaged disc assembly
2. grease or oil on disc facings
3. clutch disc splines sticking

(B) Transmission Mounts

1. broken transmission mounts
2. loose transmission mounts

(C) Pressure Plate

1. burned pressure plate face
2. worn pressure plate fingers
3. weak or broken pressure plate springs

(D) External Linkage

1. excessive deflection in linkage fire wall
2. excessive pedal free play
3. dry clutch linkage
4. bind in steering column, or column is misaligned

(E) Transmission

1. insufficient lubricant
2. housing bolts loose
3. clutch housing misaligned
4. worn transmission components
5. leaking gaskets and seals

(F) Propeller (Drive) Shafts

1. propeller shaft bent
2. unbalanced propeller shaft
3. misaligned propeller shaft

(G) Universal Joint

1. worn joint
2. insufficient lubricant

(H) Differential & Rear Axel

1. ring gear and pinion worn
2. pinion shaft bearings worn
3. seals and gaskets leaking
4. broken teeth on axel shaft gear
5. differential pinion and pinion shaft worn

(I) Release Bearing

1. noisy
2. worn

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN VII

VII. Starting and Charging Systems Domain Tasks

Description: Diagnose and repair present and potential problems in the starting and charging system components and wiring.

*Replace solenoids.
*Repair starters.
*Repair or replace charging system regulators.
*Repair generators or alternators.
*Analyze malfunctions in the cranking system.
*Evaluate alternator/generator and regulator output.
*Replace generators and alternators.
*Replace starters.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN VII: Starting and Charging Systems

Item Form Sheet

Domain Statement: Diagnose and repair present and potential problems in the starting and charging system components and wiring.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements from the test situation.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you her battery is dead every morning.

Customer 2 - Tells you her battery is always low on water.

Customer 3 - Tells you his charging indicator light stays on.

Customer 4 - Tells you his charging indicator light goes out but the battery does not charge.

Customer 5 - Tells you that his starter doesn't act right.

For Customer 1 choose 1 element from Facets A, B, C, E

For Customer 2 choose 1 element from Facets A, E

For Customer 3 choose 1 element from Facets A, B, C, E, F

For Customer 4 choose 1 element from Facets A, B, C, E

For Customer 5 choose 1 element from Facets A, B, D, F, G, H, I

CONTENT LIMITS SHEET

(A) Battery

1. low charge
2. sulfated
3. shorted cell
4. cracked case
5. loose posts

(B) Battery Cables

1. loose
2. corroded

(C) Alternator/Generator

1. loose fan belt
2. defective bearing
3. defective diode
4. defective stator/armature
5. defective rotor/field
6. excessively worn brushes

(D) Starter

1. defective bearing
2. defective armature
3. defective field
4. excessively worn brushes
5. slipping starter drive

(E) Regulator

1. cut out relay stuck
2. allows overcharge of battery
3. allows insufficient charging

(F) Wiring Harness

1. burned
2. shorted
3. loose connection
4. open circuit

(G) Fusible Link

1. loose connection
2. burned

(H) Ignition Switch

1. mechanical failure
2. loose connection
3. burned connections

(I) Solenoid

1. does not close circuit
2. does not re-open circuit
3. loose connections

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
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Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN VIII

VIII. Ignition System Domain Tasks

Description: Analyze, remove, adjust or repair and replace faulty ignition system components.

*Clean, gap and test spark plugs.
*Replace coil of the primary circuit.
*Overhaul distributors.
*Replace points and condenser.
*Inspect secondary circuit lead wires, distributor cap, and rotor.
*Measure resistance in secondary wires.
*Inspect ignition switch, resistor, wiring, and coil of the primary circuit.
*Inspect points and condenser of the primary circuit.
*Analyze or adjust engine performance using engine analyzer.
Test and repair transistor ignition systems.
*Set ignition timing.
*Strobe distributor, and modify or correct advance curves.
*Replace and adjust distributors.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION PROGRAMS.

DOMAIN VIII: Ignition System

Item Form Sheet

Domain Statement: Analyze, remove, adjust or repair and replace faulty ignition system components.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements from the test situation.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you her car is hard to start.

Customer 2 - Tells you her car skips and misses at high speed.

Customer 3 - Tells you his car will not start.

Customer 4 - Tells you his car doesn't have any power.

For Customer 1 choose 1 element from Facets, B, C, D, E, F, H, I

For Customer 2 choose 1 element from Facets, B, C, E, H

For Customer 3 choose 1 element from Facets B, C, D, F, G, I

For Customer 4 choose 1 element from Facets A, B, C, E, H

CONTENT LIMITS SHEET

(A) Distributor

1. mechanical failure
2. advance mechanism inoperative
3. improperly timed

(B) Distributor Cap and Rotor

1. excessive moisture
2. cracked
3. worn

(C) Ignition Points

1. burned
2. incorrectly adjusted
3. weak spring

(D) Condensor

1. faulty
2. loose

(E) Secondary Wiring

1. incorrectly routed to plugs
2. excessive resistance
3. poorly insulated
4. broken

(F) Primary Wiring and Resistor

1. burned
2. shorted
3. loose connections

(G) Ignition Coil

1. faulty
2. loose connections

(H) Spark Plugs

1. fouled
2. inproperly gapped
3. broken insulation
4. excessively worn

(I) Ignition Control Module

1. defective

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN IX

IX. Suspension and Steering Systems Domain Tasks

Description: Inspect, adjust, replace or overhaul faulty components in the suspension and steering systems.

Adjust worm and sector in steering gear.
Check manual steering gear fluid level.
*Replace steering spindles.
*Inspect steering gear.
*Inspect steering linkage.
*Lubricate steering gear and linkage.
Adjust or rebuild power steering units; check power steering fluid level.
Rebuild power steering units.
Repair power steering pumps.
Replace collapsible mast jackets (steering column)
Repair tilt and telescoping steering wheel.
Replace manual steering gear components.
Replace power steering components.
Replace power steering pumps.
*Replace belts and adjust tension.
Replace filter in power steering.
Adjust or replace torsion bars.
*Adjust, inspect and repack front wheel bearings.
*Balance wheels and tires.
*Check and align front end.
Inspect and replace steering damper.
*Inspect front suspension systems.
Repair front suspension systems.
*Lubricate ball joints.
*Lubricate the front and rear suspension.
*Perform visual inspections of the suspension system.
Rebush king pins or link pins.
Repair rear suspension system.
Replace ball joints.
*Replace front wheel bearing grease seal.
Replace front suspension control arms and bushings.
Replace rear suspension systems.
Replace shock absorbers and mounting.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN IX: SUSPENSION AND STEERING SYSTEMS

Item Form Sheet

Domain Statement: Inspect, adjust, replace or overhaul faulty components in the suspension and steering systems.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Tells you that her car constantly pulls to the right.

Customer 2 - Tells you that his car shimmies at 40 - 50 MPH.

Customer 3 - Tells you that her car shimmies when she hits a bump.

Customer 4 - Tells you that his car has hard or erratic steering.

Customer 5 - Tells you that her car wears out the front tires much too soon.

For Customer 1 choose one element from Facets H, J, E

For Customer 2 choose one element from Facets J, I

For Customer 3 choose one element from Facets I, A, B

For Customer 4 choose one element from Facets F, J, H, K, A, B

For Customer 5 choose one element from Facets I, H, A, B, J

CONTENT LIMITS SHEET

(A) Control Arm (Upper)

1. bent
2. bushing worn
3. inner cross shaft worn

(B) Lower Control Arm

1. bent
2. bushings worn
3. pivot bolt worn

(C) Shock Absorber

1. leaking
2. soft
3. hard

(D) Stabilizer Bar

1. mounting bushings worn
2. link bolt and grommets worn
3. bent

(E) Coil Spring

1. weak or sagging springs
2. broken

(F) Steering Gear (Box)

1. leaking
2. out of adjustment
3. not aligned
4. steering gear (box) bolts loose

(G) Ball Joints

1. excessive wear
2. dry

(H) Wheel Alignment

1. caster
2. camber
3. toe-in

(I) Steering Arms

1. idle-arm loose or worn
2. steering arm loose
3. tie rod ends worn
4. pitman arm loose
5. insufficient lubrication

(J) Tires

1. incorrect tire pressure
2. out-of-round tires
3. tires out-of-balance
4. uneven tread depth

(K) Lubrication

1. incorrect lubrication
2. insufficient lubrication

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

DOMAIN X

X. Emissions Control Domain Tasks

Description: Analyze, test, repair or replace automobile emissions control devices.

*Measuring exhaust emissions with an infrared analyzer.
*Testing the relationship of ignition timing and carburetion on HC and CO emissions.
*Testing positive crankcase ventilation system.
*Testing the fuel evaporative control system.
*Testing the exhaust gas recirculation system.
*Testing the catalytic converter system.
*Testing thermostatic air cleaner operation.
*Testing the air injection reaction (AIR) system.
*Performance testing the spark control system.

*DENOTES TAUGHT IN MOST SECONDARY TRANSPORTATION CLUSTER PROGRAMS.

DOMAIN X: EMISSIONS CONTROL SYSTEM

Item Form Sheet

Domain Statement: Analyze, test, repair or replace automobile emission control devices.

Instructions:

1. Choose one of the customer cues provided, select a vehicle, and make sure all necessary equipment, materials and instructions are readily available.
2. Randomly select elements from appropriate facets in the Content Limits Sheet specified by customer cue selected.
3. Eliminate any repetitious elements from the test situation.
4. Carefully review all of the elements included in the test situation to be sure it represents a realistic situation. Make any needed adjustments.
5. Set up the test in such a manner that the student will be forced to diagnose and correct the problem. Upon completion the vehicle should be road ready.
6. Use the scorecard provided (and others as necessary) to determine satisfactory or unsatisfactory results.
7. Make a determination, based on the program's established standards, whether or not the student should receive advanced standing within the domain tested.

CUSTOMER CUES

Customer 1 - Complains that her car has very poor acceleration as compared to when it was new. She also wants her car to meet emission standards.

Customer 2 - Complains of a pinging noise or maybe a popping noise in her engine. (Car must meet emission standards.)

Customer 3 - Tells you that her car tends to surge or slightly lunge at cruising speed. (Car must meet emission standards.)

Customer 4 - Tells you that his car dies while sitting at a red light but when when he gets to work and turns the key off, it keeps running. (Car must meet emission standards.)

Customer 5 - Complains that he gets much less miles per gallon than he did when the car was new. (Car must meet emission standards.)

For Customer 1 choose one element from Facets A, B, C, D

For Customer 2 choose one element from Facets B, C, E

For Customer 3 choose one element from Facets A, B, C, D

For Customer 4 choose one element from Facets A, B, C

For Customer 5 choose one element from Facets A, B, C, D

(A) Carburetor and Intake

1. clogged air filter
2. stuck power piston
3. improper float level
4. adjustments

(B) Ignition

1. improper timing
2. malfunctioning distributor
3. weak spark

(C) Engine Vacuum

1. defective spark relay valve
2. defective EGR valve
3. defective check valve
4. low manifold vacuum
5. defective vacuum solenoid valve
6. defective diverter valve
7. clogged PCV valve

(D) Electrical

1. choke pull off switch inoperative
2. temperature switch
3. inoperative solenoid

(E) Emissions Air Pump and Tubing

1. exhaust leak
2. noisy
3. broken belt

SCORECARD

Time Start _____

Time Stop _____

Major Block
or Domain: _____

Objective or
Domain Description:

DIRECTIONS: Score yourself from 1 to the highest possible score. Ask the instructor to do the same. You must achieve the minimum score for each criteria for successful mastery of the objective. Eliminate those indicators not deemed appropriate for the test.

PERFORMANCE INDICATORS	Std. Score	Min. Score	My Score	Instructor's Score
Proper sequencing of diagnostic steps.	10	7		
Selection of correct tools and equipment.	10	10		
Technique in use of tools and equipment.	10	8		
Time taken to pin point malfunction.	10	7		
Accuracy in locating malfunction.	10	10		
Proper removal of component part(s).	10	7		
Accuracy in determining whether to rebuild or reject a malfunctioning part.	10	10		
Accuracy in necessary component overhaul.	10	10		
Proper installation of component part(s).	10	10		
Safety performance.	10	10		
Care of tools upon completion.	10	7		
Housekeeping	10	7		
Overall quality of work.	10	7		
Time taken for complete job.	10	7		

Student Signature _____

Instructor Signature _____

APPENDICES

APPENDIX A

Sample Test Situation

SAMPLE TEST SITUATION

The following sample test situation is given to further clarify how a performance domain referenced test is constructed from a selection of test items (item pool) in the Heating and Cooling Systems Domain:

Step 1 - Customer cue number two, "Tells you that she must constantly refill her radiator," has been randomly selected.

Step 2 - A 1972 Chevelle with automatic transmission, air conditioning and power steering is the only car available.

Step 3 - Tools, test equipment, shop manuals and a service bay have been provided.

Step 4 - The following circled elements from the specified facets (on the Content Limits Sheet) have been randomly selected.

(A) Pump

(1.) leak
2. defective bearing

(E) Radiator

1. plugged
(2.) punctured or leaking

(C) Hoses

1. loose connection
(2) deteriorated
3. punctured or leaking

(F) Cap

1. bad seal
(2) weak spring
3. improper pressure

(G) Heater

(1) plugged
2. leaking

Step 5 - Noting that a car with this many problems is not a realistic situation, each element is reviewed.

Step 6 - The test automobile is then "bugged" with the chosen malfunctions (leaky water pump and radiator cap with weak spring pressure). The punctured radiator, deteriorated hoses and plugged heater core are eliminated because the instructor should be able to determine, with a fair amount of accuracy, how a student would perform on these and the other tasks in the domain by how he or she performs on the tasks selected.

Step 7 - Using the scorecard, the instructor rates the student on performance as indicated. The student also rates his or her own self (neither student or instructor should be aware of the other's rating until the test is complete).

Step 8 - Using the evaluation results, and others if necessary, the instructor counsels the student and makes a decision on the student's request for advanced standing.

APPENDIX B

Skills Test Administrators Information Form

SKILLS TEST ADMINISTRATORS INFORMATION FORM

Domain: _____

Statement: _____

Task(s) Selected: _____

Test Setup

Use a vehicle or training unit.
Have the vehicle or training unit in a working stall.
Put fender/seat covers in place (if using vehicle)
Place all required tools and equipment on a bench/table next to the vehicle or training unit.

Supplies and Equipment Needed

Shop towels
Hand tools
Fender/seat cover
Safety trouble light
Vehicle lift equipment
Safety stands
Creeper
Shop Manuals
Necessary special tools and equipment for tasks selected
Scorecard and Student Skills Test Information Sheet

Test Time

Current program time standards
Time spent gathering tools and equipment is not part of the test time.
Time spent reading directions is not part of the test time.

Special Instructions

Use the scorecard to evaluate the student
Observe the student's procedure throughout the test.
Verify that the student has read the directions before starting to time him/her.
Record starting time and completion time on the score card
Record test time in the space provided on the score card
A person may be used to help administer the test (set up and evaluate)
The test administrator must use the Item Form Sheet and Content Limits Sheet to randomly select test items
Fill in top portion of Student Skills Test Information Sheet

APPENDIX C

Skills Test Student Information Form

SKILLS TEST STUDENT INFORMATION FORM

Domain: _____

Statement: _____

Customer Cues: _____

Equipment Needed

Check to see if all items listed below are available.

shop towels
hand tools
fender/seat cover
safety trouble light
vehicle lift equipment
safety stands
creeper
shop manuals
other equipment necessary to diagnose and correct problem
scorecard

Safety

Follow all safety precautions.

Time

Current program time standards
Time spent gathering tools and equipment is not part of the test time
Time spent reading directions is not part of the test time

Evaluation

Your diagnostic ability, procedure, accuracy, safety and other items noted on scorecard
You will be observed during the performance test and evaluated according to a scorecard.
You will be expected to evaluate yourself on the scorecard provided

Directions

Study the customer cue provided above
Diagnose the problem or problems
Correct all problems
Car should be road ready when you are finished
Fill out the self evaluation section of the scorecard

GEORGIA VOCATIONAL EDUCATION
STUDENT PERFORMANCE RECORD
TRANSPORTATION/AUTOMOTIVE MECHANICS

Student Name _____ Social Security Number _____

Schools _____ Dates _____ Instructor(s) _____

Rating	Level of Performance
1	Degree of skill below minimum performance level
2	Acceptable level of skill; can perform with supervision and/or assistance
3	High level of skill; can perform independently and consistently at a high level

The rating on this compentecy record gives the entry level vocational skills this student has demonstrated based on a set standards or criteria. This record is intended for use in assessing the student's ability for employment or advanced educational purposes. An item left unmarked indicates the student has not received instruction.

The first blank indicates the secondary rating, the second blank is the post-secondary rating.

MAJOR BLOCK -- Automotive Service

PERFORMANCE GROUP -- Handtools

HT-1 ___ ___	HT-2 ___ ___	HT-3 ___ ___
HT-4 ___ ___	HT-5 ___ ___	HT-6 ___ ___

PERFORMANCE GROUP -- Chassis Lubrication

CL-1 ___ ___	CL-2 ___ ___	CL-3 ___ ___
CL-4 ___ ___	CL-5 ___ ___	CL-6 ___ ___
CL-7 ___ ___		

PERFORMANCE GROUP -- Servicing Coding Systems

SCS-1 ___ ___	SCS-2 ___ ___	SCS-3 ___ ___
SCS-4 ___ ___	SCS-5 ___ ___	SCS-6 ___ ___
SCS-7 ___ ___	SCS-8 ___ ___	

PERFORMANCE GROUP -- Servicing Suspension Systems

SSS-1 ___ ___	SSS-2 ___ ___	SSS-3 ___ ___
SSS-4 ___ ___	SSS-5 ___ ___	SSS-6 ___ ___
SSS-7 ___ ___	SSS-8 ___ ___	

MAJOR BLOCK -- Brakes

PERFORMANCE GROUP -- Hydraulic Brakes

HB-1 ___ ___	HB-2 ___ ___	HB-3 ___ ___
HB-4 ___ ___	HB-5 ___ ___	HB-6 ___ ___
HB-7 ___ ___	HB-8 ___ ___	HB-9 ___ ___
HB-10 ___ ___	HB-11 ___ ___	

MAJOR BLOCK -- Engine Overhaul

PERFORMANCE GROUP -- Valve Grinding and Adjusting

VGA-1 ___ ___	VGA-2 ___ ___	VGA-3 ___ ___
VGA-4 ___ ___	VGA-5 ___ ___	VGA-6 ___ ___
VGA-7 ___ ___	VGA-8 ___ ___	VGA-9 ___ ___
VGA-10 ___ ___	VGA-11 ___ ___	VGA-12 ___ ___

MAJOR BLOCK -- Tune-up and Electrical

PERFORMANCE GROUP -- Testing Engine

STE-1 ___ ___ STE-2 ___ ___ STE-3 ___ ___

STE-4 ___ ___ STE-5 ___ ___ STE-6 ___ ___

STE-7 ___ ___ STE-8 ___ ___ STE-9 ___ ___

PERFORMANCE GROUP -- Testing and Servicing Battery

TSB-1 ___ ___ TSB-2 ___ ___ TSB ___ ___

TSB-4 ___ ___ TSB-5 ___ ___

PERFORMANCE GROUP -- Spark Plug Service

SPS-1 ___ ___ SPS-2 ___ ___ SPS-3 ___ ___

SPS-4 ___ ___ SPS-5 ___ ___

PERFORMANCE GROUP -- Testing Ignition Coil and Condenser

TIC-1 ___ ___ TIC-2 ___ ___

PERFORMANCE GROUP -- Testing Ignition Distributor

TID-1 ___ ___ TID-2 ___ ___ TID-3 ___ ___

TID-4 ___ ___ TID-5 ___ ___

PERFORMANCE GROUP -- Testing Charging System

TSC-1 ___ ___ TSC-2 ___ ___ TSC-3 ___ ___

TSC-4 ___ ___ TSC-5 ___ ___ TSC-6 ___ ___

TSC-7 ___ ___ TSC-8 ___ ___ TSC-9 ___ ___

TSC-10___ ___ TSC-11___ ___ TSC-12___ ___

TSC-13___ ___

PERFORMANCE GROUP -- Testing Starter Motor

TSM-1 ___ ___ TSM-2 ___ ___ TSM-3 ___ ___

TSM-4 ___ ___

PERFORMANCE GROUP -- Fuel Systems

FS-1 ___ ___ FS-2 ___ ___ FS-3 ___ ___

FS-4 ___ ___ FS-5 ___ ___ FS-6 ___ ___

MAJOR BLOCK -- Automotive Emission Control

PERFORMANCE GROUP -- Automotive Emission Controls

AEC-1 ___ ___ AEC-2 ___ ___ SEC-3 ___ ___

AEC-5 ___ ___ AEC-5 ___ ___ AEC-6 ___ ___

AEC-7 ___ ___ AEC-8 ___ ___ AEC-9 ___ ___

AEC-10___ ___

MAJOR BLOCK -- Small Engines

PERFORMANCE GROUP - Small Engine Repair

SE-1 ___ ___ SE-2 ___ ___ SE-3 ___ ___

SE-4 ___ ___ SE-5 ___ ___ SE-6 ___ ___

SE-7 ___ ___ SE-8 ___ ___ SE-9 ___ ___

SE-10___ ___ SE-11___ ___ SE-12___ ___

SE-13___ ___

MAJOR BLOCK -- Marine Engines

PERFORMANCE GROUP -- Outboard Marine Engine Repair

ME-1 ___ ___ ME-2 ___ ___ ME-3 ___ ___

ME-4 ___ ___ ME-5 ___ ___ ME-6 ___ ___

ME-7 ___ ___ ME-8 ___ ___ ME-9 ___ ___

ME-10___ ___ ME-11___ ___ ME-12___ ___

ME-13___ ___ ME-14___ ___ ME-15___ ___

ME-16___ ___

COMMENTS:

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Title VI - Peyton Williams Jr., Associate Superintendent of State Schools and Special Services
Title IX - Evelyn Rowe and Myra Tolbert, Coordinators
Section 504 - Jane Lee, Coordinator of Special Education

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